Municipality debt in Germany: A spatial econometric approach

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Motivation

- Research objective is to estimate interaction of neighboring municipalities via debt
- Based on spatial econometric literature on tax and spending interaction of local governments (Effect usually between 0.2 and 0.6)
- Problem that tax or spending interactions are estimated separately in literature, which ignores common budget constraint [Allers and Elhorst (2010)]
- Address this problem by using debt as "residual" of tax and spending interaction
- This might catch the whole spillover effect of government activity and may give important additional insights into local governmental interaction

Setup

- Data suitable to estimate the basic model of the spatial tax and spending interaction literature
- Panel from 1999 - 2006 for German federal states of NRW and Bavaria (n = 396 / 2,056)
- Y - Accumulated per capita debt (FE specification allows interpreting the coefficient as new debt)
- Accumulated per capita debts consists of debt from the core budget (Kernhaushalt) and short term debt (Kassenkredite), outsourced debt from public companies are not included
- X - Population, Population², population structure (<15, >65), unemployed per inhabitant
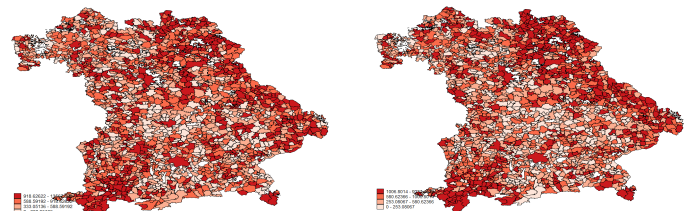
Debt in space and time

Quartile map of per capita debt in NRW
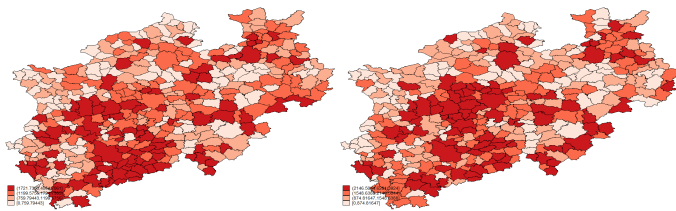
NRW 1998

NRW 2006

Quartile map of per capita debt in Bavaria

Bavaria 1998

Bavaria 2006

Empirical strategy

- We apply the Spatial Durbin model:
$$Y=\lambda WY+\beta X+\theta WX+\varepsilon$$
- W is a row normalized binary contiguity matrix
- Double demeaning of data takes spatial and time FE into account
- Estimation via Maximum Likelihood with bias correction proposed by Lee and Yu (2010)
- Comparison of tax, spending and debt interaction
- Focus on the term λWY

Results

Comparison of tax, spending and debt interaction with the basic model 1999 - 2006					
	(1)	(2)	(3)	(4)	(5)
Interaction	λWY of per capita debts	λWY of per capita net spending	λWY of business tax rate	λWY of property tax rate A	λWY of property tax rateB
NRW	0.129***	0.082***	0.302***	0.150***	0.380***
t-stat	(4.763)	(2.952)	(12.279)	(5.571)	(16.372)
R	0.9295	0.8493	0.9396	0.9555	0.9429
Corr(Y,Ŷ)²	0.1804	0.0364	0.0565	0.0189	0.0596
Bavaria	0.156***	0.057***	0.234***	0.141** *	0.152***
t-stat	(13.268)	(4.651)	(20.808)	(11.903)	(12.901)
R	0.8905	0.7448	0.9096	0.9545	0.9376
Corr(Y,Ŷ)²	0.0201	0.0056	0.0145	0.0116	0.0178

t-values in parentheses * p < 0:10, ** p < 0:05, *** p < 0:01

Interpretation

- Degree of debt interaction is between the tax and the spending interaction
- The basic specification gives a good measurement of the interaction effect (R² ≈ 0.9)
- However, the included independent variables have small explanatory power [Corr(Y,Ŷ)²<0.18/0.02]
- The huge difference between R² and Corr(Y,Ŷ)² indicate that municipal and time fixed effects explain a lot of the variation of Y
- Magnitude of debt interaction is robust, also when controlling for "mandatory volatility" or "volatility measures"

Conclusions and future work

- Evidence for debt interaction
- Governmental debt might work as a transmitter / residual between spending and taxational interaction of local governments
- **To do:**
- Robustness check of results against different specifications of W
- Incorporate first lag of the municipality debt, since new debt might have a path dependency
- Calculate λWY using panel information for every year and match patterns with political cycle and business cycle

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